

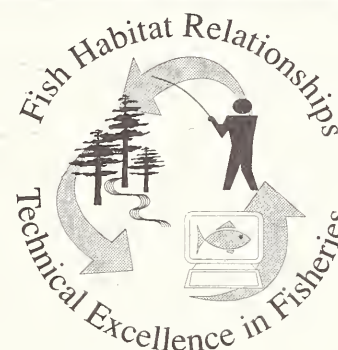
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# FHR Currents...

Fish Habitat Relationships Technical Bulletin  
Number 13 November 1993



## Annual Accomplishment Report -- 1992 Fish Habitat Relationships Program

Jeffrey L. Kershner  
National Fish Habitat Relationships Program Leader  
USDA Forest Service, Washington Office  
Fish & Wildlife Department  
Utah State University  
Logan, UT 84322-5210

### Purpose

Effective management of the diverse and complex aquatic resources on National Forest System lands requires biologists to have the best possible understanding of aquatic ecosystems and the processes that influence aquatic resources. The National Fish Habitat Relationships (FHR) Program provides a broad framework for the development of technology and the dissemination of this technology to biologists. This paper is the annual report of the USDA Forest Service, FHR Program. This is a summary of the FHR Program accomplishments from the national program and from Regions 1, 2, 4, 5 and 6 (R-1, R-2, R-4, R-5 and R-6).

### Background

In 1981, a national steering committee was established to develop a program to provide systematic methods for evaluating fish and wildlife habitats and applying that information in land management planning and project decisions that affect fish and wildlife habitat. In 1982, at the recommendation of the steering committee, a Wildlife and Fish Ecology Group was established to develop a framework for what was to become the Wildlife/Fish Habitat Relationships Program.



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## FHR Currents Purpose

The USDA Forest Service Fish Habitat Relationships Program was established to further the development of fisheries technology and transfer this technology to field biologists. With ever increasing demands for natural resources, protection and management of aquatic communities require biologists to be knowledgeable of current research findings and state-of-the-art techniques. The purpose of *FHR Currents* is to provide a vehicle to quickly disseminate information important to field-level biologists in the USDA Forest Service.

## Submissions:

If you wish to submit a paper for publication in *FHR Currents*, please contact the following people for information and guidelines:

*Jerry Boberg/Dave Fuller*  
Technical Editors  
(707) 441-3669  
*Stephanie Gomes*  
Editor/Designer  
(707) 441-3550

Six Rivers National Forest  
Fisheries Department  
1330 Bayshore Way  
Eureka, CA 95501

## Who Are We?

### Forest Service Fish Habitat Relationships Program Leaders or Representatives:

#### National FHR Program

Jeffrey L. Kershner  
Washington Office  
Fish & Wildlife Department  
Utah State University  
Logan, UT 84322-5210

#### Region 1

Richard Torquemada, Northern Region  
Wildlife, Fish & Botany Staff  
Federal Building, P.O. Box 7669  
Missoula, MT 59807

#### Region 2

R. Nick Schmal, Rocky Mountain Region  
Wildlife, Fish & Botany Staff  
University of Wyoming, College of Agriculture  
P.O. Box 3354  
Laramie, WY 82071-3354

#### Region 3

Bryce Rickel, Southwest Region  
Wildlife, Fish & Botany Staff  
Federal Building  
517 Gold Ave., S.W.  
Albuquerque, NM 87102

#### Region 4

Seona L. Brown, Intermountain Region  
Wildlife, Fish & Botany Staff  
324 25th St.  
Ogden, UT 84401

#### Region 5

Jerry Boberg, Pacific Southwest Region  
(Anadromous Fish Program)  
Six Rivers National Forest  
1330 Bayshore Way  
Eureka, CA 95501

### Associates:

Glenn Chen  
Fisheries Biologist/Monitoring Specialist  
USDA Forest Service  
Fish & Wildlife Department  
Utah State University  
Logan, UT 84322-5210

David Fuller, Fisheries Biologist  
USDA Forest Service  
Six Rivers National Forest  
1330 Bayshore Way  
Eureka, CA 95501

Ken Roby, Hydrologist  
USDA Forest Service  
Pacific Southwest Experiment Station  
P.O. Box 245  
Berkeley, CA 94701-0245

#### Region 5, (continued)

Jeffery Reiner, Pacific Southwest Region  
(Resident Fish Program)  
Lake Tahoe Basin Management Unit  
870 Emerald Bay Rd., Suite 1  
South Lake Tahoe, CA 96150

#### Region 6

Deborah Konnoff, Pacific Northwest Region  
Wildlife, Fish & Botany Staff  
333 S.W. 1st Ave., P.O. Box 3623  
Portland, OR 97208

#### Region 8

Cindy A. Williams, Southern Region  
Wildlife, Fish & Botany Staff  
1720 Peachtree Rd.  
N.W. Atlanta, GA 30367

#### Region 9

Don Hair, Northeast Region  
Nicolet National Forest  
Federal Building, 68 South Stevens  
Rhinelander, WI 54501

#### Region 10

Ron Dunlop, Alaska Region  
Wildlife, Fish & Botany Staff  
Federal Office Building, Box 21628  
Juneau, AK 99802-1628

#### Intermountain Research Station

Kerry Overton, Intermountain Research  
Intermountain Research Station  
316 E. Myrtle St.  
Boise, ID 83702

Larry Schmidt  
Stream Systems Technology Center  
USDA Forest Service  
Rocky Mountain Experiment Station  
240 W. Prospect  
Fort Collins, CO 80526-2098

Mark Vinson  
Hydrologist/Monitoring Specialist  
USDI Bureau of Land Management  
Fish & Wildlife Department  
Utah State University,  
Logan, UT 84322-5210



The primary goal of the FHR Program is to promote "Technical Excellence in the Forest Service Fisheries Program." There are two primary elements identified in the program: (1) the development of technology to assess fish habitat condition and to understand fish/habitat relationships; and (2) the transfer of technology to fishery biologists in the field.

The National FHR Program is currently based at Utah State University in cooperation with the Fisheries and Wildlife Department, College of Natural Resources. Regional programs are located in six of the nine Forest Service regions. In addition, Regions 1 and 4 of the Forest Service, in cooperation with the Intermountain Forest and Range Experiment Station, have a technology development/transfer specialist operating within the FHR Program.

## **FHR Program Changes**

In 1992 several changes in regional and national staffing occurred. In R-2, FHR Program Leader Nick Schmal moved from the Medicine Bow National Forest (NF) to a cooperative position with the Rocky Mountain Station and the Range Science Department, University of Wyoming. Nick will still be the FHR Program leader, but now has an opportunity to explore technology development/transfer opportunities with Forest Service research and the University of Wyoming. This liaison has resulted in several cooperative projects. Ken Roby, technology transfer specialist for hydrology and fisheries, was added to the R-5 staff at the Pacific Southwest Forest and Range Experiment Station in Albany, California. Ken was formerly a hydrologist with the Plumas NF. In R-6, Deborah Konnoff was added to the regional office fisheries staff as the FHR Program leader. Debbie was formerly a biologist with the Siskiyou NF. Nationally, an inter-agency aquatic monitoring group was formed between the Forest Service and Bureau of Land Management (BLM). Mark Vinson, BLM hydrologist, and Glenn Chen, Forest Service fisheries biologist, join Fred Mangum of the R-4 Forest Service Aquatic Invertebrate Laboratory.

These aquatic scientists joined Rich Torquemada, R-1 fisheries program assistant; Bryce Rickel, R-3 WFHR program leader; Seona Brown, R-4 fisheries program assistant; Jerry Boberg, R-5 anadromous FHR Program leader; Jeff Reiner, R-5 resident FHR Program leader; and Don Hair, designated R-9 FHR representative.

## **Technology Development**

In 1992 there were 47 technology development projects initiated or ongoing in the FHR Program. These projects were cooperatively carried out with 25 national forests, five research stations, and seven universities. The following are the summaries for technology development in the national and regional FHR programs.

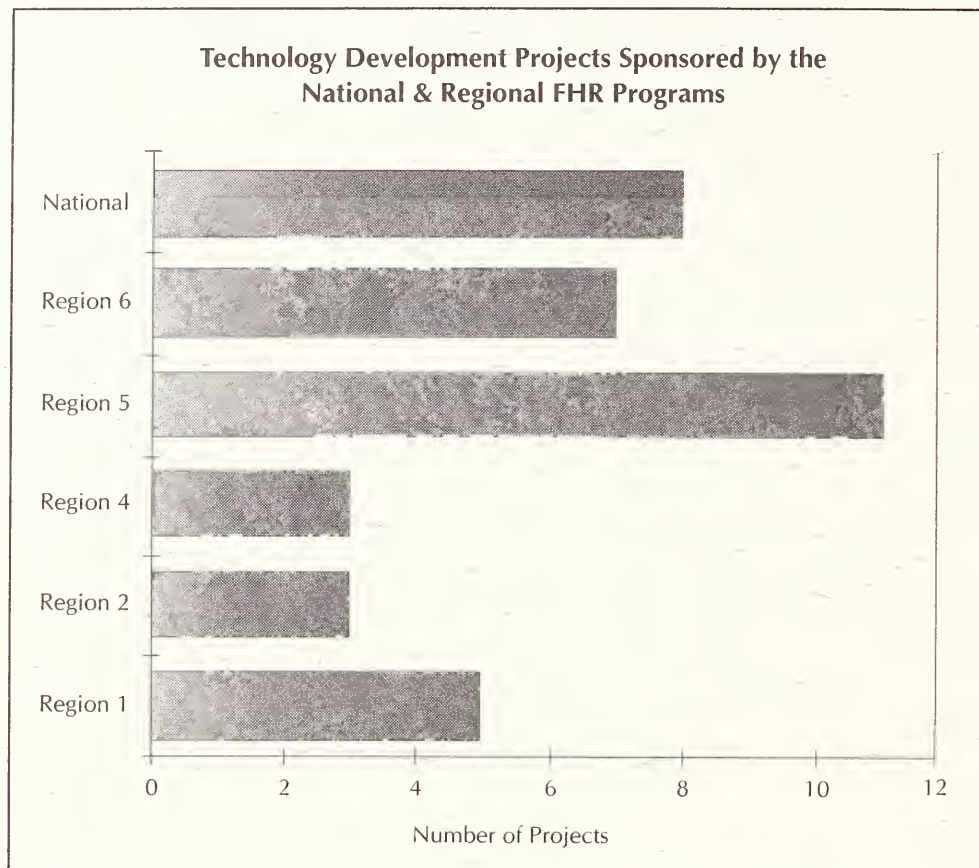
### **National FHR Program**

1. Hawkins, C.P. and D.W. Carlisle.  
Classification and management strategies  
for high mountain lakes in the Uinta Mountains.

The objectives of the project are to develop cost effective inventory strategies and management prescriptions for high mountain lakes. One year of survey data has been collected and is being analyzed. Expected products are a cost-effective inventory procedure and analysis technique for high mountain lakes. This project is jointly sponsored by the Wasatch-Cache NF and the FHR unit; completion is expected in winter 1994.

2. Edwards, C. An evaluation of artificial structures and their effectiveness in producing walleye spawning habitat.

The objectives of the project are to describe the most effective structures for producing walleye spawning habitat and to describe possible prescriptions for placement. The first year of field data has been collected and has been summarized in a report. This project is sponsored by the North Central Research Station and the FHR unit to explore the success of construction of artificial spawning reefs in enhancing walleye populations.



**3. Crowl, T. A. and J. L. Kershner. A hierarchical approach to understanding variables that limit fisheries in watersheds.**

The objective of the project is to develop a system to analyze among stream and within stream standardized variables that will allow resource managers to identify factors that potentially limit fish abundances and distribution. Analyses can be conducted on many different scales of data.

Currently there is an operational model being tested. This model was presented at the Basin Surveys and Applications course in spring 1993. This project is jointly sponsored by the Intermountain Region and the FHR unit.

**4. Kershner, J.L. and D.P. Horan. Developing silvicultural prescriptions for fish habitat objectives in the north slope Uinta Mountains.**

The objective of the project is to develop silvicultural prescriptions to maintain long-term inputs of debris into stream systems. This project is currently finishing the first year. This project is

jointly sponsored by the Wasatch-Cache NF, Intermountain Region and the FHR unit. The first presentation was given at the September 1992 National American Fisheries Society meeting.

**5. Black, R. W., J.L. Kershner and T. A. Crowl. A habitat restoration and recovery template for the Colorado River cutthroat trout in the Uinta Mountains.**

The objectives of the project are to determine what habitat factors are important to maintain viable populations of Colorado River cutthroat trout and how historic log drives have influenced stream habitat condition. This information will be used to develop a restoration template for habitat in streams. Currently we have two phases under way. The first is looking at the influence of woody debris on the distribution and abundance of cutthroat trout. The second is developing landscape level prescriptions to manage riparian habitats and recruit woody debris into streams. This three-year project, in its second year, is jointly sponsored by the Intermountain Region



and the FHR unit. Presentations from this work have been given at regional AFS meetings, the North American Benthological Society national meeting, and the annual Desert Fishes Council meeting. We have incorporated this work into our continuing education courses. A two year summary report will be available in May 1993.

**6. Fallau, S. S. and J. L. Kershner. A comparison of spring snowmelt flows and low summer flows on the distribution and characteristics of channel units and fish populations.**

The objectives of the project are to determine how fish habitat changes during the transition from high flows to low flows. If these changes are significant, then inventory and monitoring of stream habitats may need to be standardized to flow regime. Stream habitat complexity and the quality of riparian habitats are important influences on the quality of stream habitat during high flows. This project is jointly sponsored by the FHR unit and the Caribou NF. The Master's thesis from this project is in draft. The work was presented at regional AFS meetings.

**7. Bartz, K. L. and J. L. Kershner. The applicability of using aerial videography in classifying riparian habitats.**

The objective of this project is to assess the viability of aerial videography to classify riparian habitat. Aerial videography has been used as a low cost method to classify vegetation and has been shown to be a valuable long term monitoring tool in agriculture. We used aerial videography to classify riparian complexes and as the initial input mapping to Geographic Information Systems (GIS). The second phase of our project is to determine the applicability of the method to classifying stream habitats. This project is sponsored by the FHR unit. The Master's thesis for the project is complete. The presentation of the work was given at a May 1992 national Remote Sensing workshop. A publication is available from the FHR unit in Logan, Utah.

**8. Hougard, T., C. P. Hawkins and J. L. Kershner. The use of low level aerial photography and GIS to assess fish habitat.**

The objectives of this project are to demonstrate the use of low level aerial photographs as input into GIS, and assess the utility of GIS in evaluating fish habitat conditions. This project is sponsored by the FHR unit. The Master's thesis for the project is in draft form.

**9. Kershner, J. L. and W. M. Snider. Assessing fish habitat relationships in the Truckee River drainage to design instream flow studies.**

The objectives of this project are to: (1) determine the effects of regulated flows on tributary streams within the upper Truckee basin below Lake Tahoe; and (2) evaluate habitat enhancement as a mitigation for reduced instream flows. This project, sponsored by the Tahoe NF, California Department of Fish and Game, and national FHR unit, has resulted in three peer reviewed publications and four presentations at various regional and sectional AFS meetings.

## **Region 1: Northern Region FHR Program**

**1. Thurow, R. and K. Overton. Habitat partitioning by resident and anadromous salmonids in wilderness and non-wilderness watersheds.**

The project objectives are to describe summer habitat utilization by resident and anadromous salmonids and compare habitat partitioning by species in wilderness and non-wilderness watersheds. The physical and biological data collected as part of the R-4/Intermountain Inventory Program in 1991 and 1992 is being summarized. Other data sources are being acquired (i.e. BPA data, USFWS data, Idaho F&G data). Plans are to collect data in 1993 with analysis to begin the latter part of 1993.

**2. Overton, K. Development and evaluation of standard fish habitat inventory parameters and procedures for R-1/R-4 forests.**

The project objectives are to develop and evaluate physical habitat parameters and sampling procedures to characterize R-1/R-4 streams and identify and evaluate a standard core set of inventory parameters that could be used to link with Desired Future Conditions (DFC) parameters, FHR research, and forest monitoring. Inventory parameters and procedures have been recommended to R-1/R-4 forests. We are currently evaluating the ties of the recommended parameters to DFC numeric values, habitat conditions assessments, and PACFISH recommended parameters. Plans are to develop a habitat inventory handbook.

**3. Armstrong, R., K. Overton, G. Chandler and J. Pisano. Development of DFC templates for the Intermountain West anadromous fish streams.**

The project objectives are development and evaluation of inventory and monitoring protocols to describe DFCs for R-1/R-4 anadromous fish streams and development of DFC templates for assessing managed streams. Data has been summarized and transferred to the forests. A completed report recommending interim DFC variables and numeric ranges has been transferred to R-1 and R-4. Evaluation and refinement of habitat variables and numeric ranges continues.

**4. Nelson, R., K. Visnovsky and K. Overton. Development of a computerized fish habitat database management system for inventory data.**

The project objectives are: (1) the development of a user-friendly fish habitat inventory database management system for storing, retrieving, analyzing and displaying inventory data collected using the proposed R-1/R-4 inventory procedures; and (2) the development of an interface with Data General Oracle for future links with the USFS corporate data base. The basic structure of the PC database management system has been developed. Format and templates for data entry, data summary, and reports are currently being used

and evaluated by some Forests in R-1 and R-4. The system will continue to develop and be updated as inventory parameters and procedures are refined, and as Forest Service biologists' data needs are identified and incorporated into standard data reports. The current system is available to all R-1/R-4 forests. A user manual is being written.

**5. Overton, K., K. Duncan and M. Radko. Development and evaluation of monitoring tools and procedures to detect habitat changes resulting from land management activities.**

The project objectives are to evaluate existing monitoring procedures to determine cost-effectiveness, to develop and evaluate habitat and biological parameters that display habitat change, and to develop and test new technologies (GIS, GPS, Videography, DFC Templates). We reviewed several forest fish habitat monitoring programs. We found many procedures to be very expensive and labor intensive; parameters were non-repeatable; monitoring plans had unclear objectives; and many LMPs did not adequately identify objectives and costs. We are currently evaluating pilot projects conducted in 1991 and 1992. Results of these pilot projects are being presented at biologist workshops.

**6. Roberts, B. and K. Overton. Assessment of smolt density model for monitoring forest smolt production capability objectives.**

The project objectives are to identify the assumptions and limitations of existing smolt density models and identify ties to the R-1/R-4 Standard Inventory Procedures, and make recommendations to improve the accuracy of the model. Outputs of the existing model using local and Columbia Basin data are being compared. A technical report is in progress to describe the results of the comparison and to list assumptions and limitations.



## **Region 2: Rocky Mountain Region FHR Program**

1. Richmond, Ann D. and K. Fausch.  
Characteristics and function of large woody debris  
in mountain streams of northern Colorado.

The purpose of the study is to measure the characteristics and functions of large woody debris (LWD) in undisturbed streams draining old-growth forests in the mountains of northern Colorado, and to provide fisheries biologists with information useful for managing these systems to enhance trout populations. The objectives of the study are to: (1) determine how much LWD is present in undisturbed streams; (2) measure relevant characteristics such as size and orientation; (3) assess its function in shaping channels and forming fish habitat; and (4) suggest rates of LWD recruitment to, and disappearance from, stream systems. The project is in cooperation with the Arapaho-Roosevelt NF, Rocky Mountain Forest and Range Experiment Station, FHR Program and Colorado State University, Department of Fisheries and Wildlife. Expected completion is 1994.

2. Herger, L. 1993. Assessment of basin-wide habitat inventory technique relative to Colorado River cutthroat trout.

The purpose of the study was to determine whether a basin-wide inventory is a useful means of habitat assessment and also to identify the habitat features that may be affecting the abundance of Colorado River cutthroat trout. Specific objectives were to: (1) determine if physical features vary among habitat unit types and their subtypes; (2) determine if habitat unit types, subtypes and their physical features influence fish abundance (presence, standing stock, and density) and size; and (3) determine if declining streamflow from July to August influences abundance of habitat unit types, subtypes, and their physical features, as well as fish abundance. Project is in cooperation with the Medicine Bow NF, Hayden Ranger District, Rocky Mountain Forest and Range Experiment Station, and the Wyoming Cooperative Fisheries & Wildlife Research Unit, University of Wyoming.

3. Lanning, D. R. and T. Wesche. 1992. Evaluation of trout habitat restoration, Battle Creek Wyoming.

Four secondary channels were augmented with flow in 1990 as part of a Forest Service restoration plan to improve fish habitat and associated riparian habitat in Battle Creek, Wyoming. Objectives of the study were to assess the short-term fish habitat tradeoffs of the restoration strategy. Management objectives focused on slowing and spreading stream flow, thereby reducing erosive stream power, trapping finer gravel for enhanced trout reproduction, rebuilding degraded stream banks, and creating needed pool habitat in Battle Creek. This was the first phase of a four year project. Cooperators included the Cooperative Extension Service, University of Wyoming, Medicine Bow NF, Hayden Ranger District, FHR Program, Department of Range and Watershed Management, Trout Unlimited and Wyoming Wildlife Federation.

## **Region 4: Intermountain Region FHR Program**

1. Visnovsky, K., R. Nelson, K. Overton and D. Price. FY91 fish habitat inventory data summary for the Challis and Salmon national forests.

The project objectives are to develop a pilot data base using the proposed R-1/R-4 inventory parameters and procedures to evaluate management utility and cost-effectiveness and work with Forest Service biologists to develop data needs to assist in meeting forest management objectives. Fish habitat inventories were completed on 150 miles of anadromous fish streams within the two forests. Data has been summarized and transferred to the forest via a database management system and a decision support system. Training on both systems has been completed, and we are monitoring the use and effectiveness of these two database systems.

2. Overton, K., J. Pisano, G. Chandler and J. Schmidt. Evaluation of monitoring procedures to assess the effects of cattle grazing on channel morphology and fish habitat.

The project objectives are: (1) to compare data collected by the proposed R-1/R-4 inventory procedures and DFC templates; and (2) to evaluate the use of photo points (videography) to display and monitor riparian and channel morphology. Data collected in 1991 on Silver Creek has been summarized and analyzed, and an Intermountain technical report is being written. Data collected in 1992 is currently being processed.

3. Roberts, B., K. Visnovsky and K. Overton. Region 4 fish habitat inventory coordination.

The project objectives are: (1) to coordinate with district and forest fisheries biologists, crew leaders and seasonal crews to ensure that everyone is kept current on the inventory procedures and any changes that might occur in the interim in order to improve data consistency between the R-4 anadromous forests; (2) schedule and provide the seasonal crews from the R-4 anadromous forests training in techniques, procedures, etc. needed to complete the required R-1/R-4 Fish Habitat and Snorkeling Inventories as required by the Columbia River Basin Anadromous Fish Habitat Management Policy and Implementation Guide; (3) assist the district and forest fisheries biologists and crew leaders to ensure quality and consistent data collected by seasonal crews and contractors; (4) assist the forests as needed with recruitment and hiring of seasonal crews; (5) assist the forests with data entry and proofing upon request; and (6) produce a training slide show for both the R-1/R-4 Fish Habitat and Snorkeling Inventories this upcoming winter. We are currently processing the 1992 data. Summarized data is being tabulated on a PC decision support system and is being transferred to the forests. Preparation for the 1993 inventory effort is underway.

4. Radko, M., K. Overton and D. Burns. Development and evaluation of fisheries technical tools for R-1/R-4 Forest Service fishery biologists, demonstration watershed project, Rapid River (unmanaged watershed) and Boulder Creek (managed watershed), Payette NF.

The project objectives are: (1) to evaluate fish habitat and biological inventory procedures for developing a watershed fishery resource database; (2) identify and compare inventory parameters to determine if differences exist between the two watersheds; (3) develop and test predictive tools for describing the relationship between watershed activities, fish habitat, and fish production; (4) develop the data format and procedures for completing a risk analysis; (5) evaluate aerial videography for displaying channel conditions; (6) develop a fishery resource GIS using inventory data, GPS, and videography; and (7) determine the steps for integrating the fishery resource GIS with other GIS data layers (soils, roads, harvest units, etc.). Two years of data collection has been completed. A manuscript describing habitat differences and sampling frequencies is in press. A second manuscript describing differences in fish distribution is in preparation. The development of procedures to convert Boulder and Rapid River data to GIS map layers is currently underway.

## **Region 5: Pacific Southwest Region FHR Program**

1. Martichang, M. Using address matching to represent locations of fish habitat in a GIS.

Two objectives were identified to guide project development: (1) Identify procedures for preparing existing fish habitat data set for input to and manipulation by the corporate GIS envisioned by the Forest Service integrated information management system (Project 615); (2) recommend revisions to the current habitat inventory and biological survey techniques that would facilitate more efficient, accurate and economical integration of future data sets to the corporate GIS environment. Automated, more sophisticated spatial analysis methods are needed



for biologists to become more effective in allocating the scarce resources at their disposal. GISs offer solutions that biologists need, but require that existing non-spatial data sets be restructured to facilitate incorporation to the GIS environment. The R-5 Anadromous FHR staff supplied funding to the faculty of the College of Natural Resources and Sciences and the California Cooperative Fisheries Research Unit, both located at Humboldt State University.

## **2. Roby, K. Establishment of a database for the Pacific Southwest Region.**

The objective for the project is to create a regional database to help establish DFC criteria for fish habitat in streams throughout California. This set of criteria will act as a "benchmark" with which current habitat conditions can be measured and compared. Stream habitat data has been collected throughout the region using a set of standardized parameters outlined in the Regional Fisheries Habitat Evaluation Handbook (FSH 2609.32) since 1988. This database will be linked to the Forest Service National Monitoring Center in Logan, Utah where it can be used to assist in multi-regional analysis. The R-5 FHR Program and the Pacific Southwest Experiment Station in Albany agreed to store and manage data from Pacific Southwest Region national forests in a centralized database located at the Albany station.

## **3. Olson, A. Large woody debris in the Klamath Province.**

The objective of this study is to determine the number and size of large woody debris (LWD) in portions of five Klamath NF streams that are minimally affected by human activities. This information will be used to determine DFCs for large wood inputs in Klamath Province streams. This will provide managers with measurable guidelines for fish habitat quality for use in future protection and restoration. This program is supported by the Klamath National Forest and the R-5 FHR Program. Data have been entered into a database and analysis is currently underway. A draft of the findings from this project is due for completion in December 1992.

## **4. McCain, M. Woody debris recruitment in the Smith River drainage.**

The objectives of this study are to: (1) investigate the relationships of LWD availability and recruitment to the distribution, abundance and community structure of aquatic vertebrates; (2) quantify the condition, distribution and abundance of stream habitat types created or influenced by LWD; (3) quantify the relative distribution and abundance of members of the aquatic community, stratified by habitat type; and (4) study the relationships of riparian and upland vegetation communities to LWD recruitment. Forest research and practice has indicated that natural processes associated with long term forest viability are extremely vital in maintaining stream productivity. A cooperative investigation with Pacific Southwest Research Station has been undertaken at the Smith River National Recreation Area to study the links between streams and adjacent forests integrating aspects from wildlife, landscape ecology, geomorphology, land use history and fisheries. This will allow present conditions to be viewed in light of past activities and serve as a starting point for long term monitoring of management activities and disturbance recovery.

## **5. Azuma, D., D. Fuller and R. Rudiger. Repeatability of habitat classification.**

The objective of this project is to test the repeatability of the regional stream habitat classification procedure. Three forests are currently part of the project and have independently made repetitions of habitat surveys. The Six Rivers NF performed repeat surveys on two streams. The Sierra NF, in cooperation with the Pacific Southwest Experiment Station, performed four repetitions on a 1,000 meter stretch of stream. The Stanislaus NF performed three repetitions on a short stretch of one stream. Data analysis for this project was performed in Fiscal Year 1992. The results of these tests indicate that basin level habitat classification should be viewed as a stream survey and not be used as a monitoring tool. However, certain parameters that are included in the standard regional habitat



assessment procedures can be useful for monitoring. Results from these studies are still preliminary. These studies will be written as an article for *FHR Currents* and published in a fisheries management journal.

**6. Furniss, M. Reducing costs and environmental risks from road stream crossings.**

The primary objective of this project is to produce a coherent, useful manual for resource agencies and private industry to design and evaluate stream crossings in Northern California. This manual will include: flood frequency analysis guidelines for culvert sizing, fish passage considerations, cost alternatives, guidelines for assessing potential failure, and hypothetical field examples. In addition, annual reports will be published that document all the original research from this project as well as literature reviews. Funding sources and cooperators on this project include: the R-5 FHR Program, California Department of Forestry and Fire Protection, Environmental Protection Agency, National Council of the Paper Industry for Air and Stream Improvement, Institute of River Ecosystems, and Six Rivers NF Hydrology.

**7. Olson, A. Compilation and reporting of stream water temperature data.**

Currently, a standardized reporting format for stream temperature data does not exist. The objective of this project is to develop a standardized reporting format for stream temperature data. This format will summarize daily minimum, average, and maximum water temperatures as well as monthly averages and extremes. The Klamath NF, Six Rivers NF, California Department of Fish and Game, U. S. Fish and Wildlife Service, and Karuk Tribal are jointly co-sponsoring this project. Recommendations for a standard stream water temperature format will be produced.

**8. Dobush, S. and W. Cole. Outmigration of anadromous salmonids.**

This study measures the productivity of anadromous salmonids in Camp Creek (tributary

to the Klamath River), Horse Linto Creek (tributary to the Trinity River) and Willow Creek (tributary to the Trinity River) by enumerating outmigrant juveniles. The objectives of this study are: (1) to determine the out-migration timing of juvenile steelhead; (2) to determine if the number of outmigrating steelhead trapped is equal among margin, intermediate and thalweg velocity zones within the trapping site; and (3) to develop a method for estimating juvenile steelhead production. The application of these results will provide input for identifying the most appropriate pipe trap locations for maximizing capture of juvenile steelhead. This project is jointly sponsored by the Six Rivers NF and the FHR unit.

**9. Fuller, D. Assessing population size of anadromous salmonids on a yearly basis.**

Techniques for assessing the total number of fish within a watershed using a basin-wide approach have been recently developed. Determining the total number of fish during any one season of any one year gives a snapshot of the population for that season and year but does not give any information on seasonal or year-to-year variability or potential carrying capacity. The objective for this project is to examine the amount of variability among years. Juvenile salmonid populations will be compared to outmigration and spawning data. The amount of year-to-year variability can be assessed so that perhaps the value of a one-year population estimate can be judged. The project is jointly sponsored by the R-5 FHR unit and the Six Rivers NF.

**10. Myers, M. and L. Wold. Cumulative watershed effects and desired future conditions.**

The objective of this project was to develop a regional process to evaluate the cumulative effects of forest activities on fish habitat. A review of pertinent literature was conducted and input was sought from riparian and watershed specialists, scientists from the Pacific Southwest Experiment Station, Cal Trout, and fishery biologists throughout the region. Data collection methods which rely on quantitative, repeatable methods are currently being field tested. The results from these

tests can be used to recommend changes to the current regional methods from stream habitat data collection. A draft of this process has been completed and is currently being reviewed and revised. This is a joint project between the R-5 FHR unit and the Sierra NF. The results from this work will be shared at the next regional fishery biologists meeting and submitted for publication in *FHR Currents*.

**11. Eddinger, H. Desired future conditions in meadow streams.**

The objective of this study is to develop a methodology to help assess the DFCs of meadow streams that have been impacted by various effects such as grazing. The information was gathered on meadow streams that are currently in nearly pristine conditions. This study is part of a region-wide effort to set criteria for DFCs of streams in meadows on national forest lands. Data from this study will be used as a template to help restore meadows and maintain healthy aquatic ecosystems. Data analysis and recommendations for future studies in the national parks is currently in progress. This study is co-sponsored by the R-5 FHR Program and the Park Service.

**12. Baldwin, K. Coarse sediment transport.**

The objective for this project is to determine how landslides influence coarse sediment budgets in the central Klamath Mountains and ultimately how this sediment movement influences anadromous fish habitat. Cross-sections of the stream will be selected to represent conditions throughout unconfined reaches of stream. These cross-sections will be measured yearly to learn the magnitude of changes occurring during years of low flow. Also, we will further document cross-sectional changes with photographs from low altitude aircraft. A presentation of the method and means of interpreting the data will be prepared. An abstract of a poster presentation to the November 1992 Watershed Management Council meeting will include the work performed under this grant. The project is sponsored by the R-5 FHR Program.

## **Region 6: Pacific Northwest Region FHR Program**

**1. A smolt capability procedure for Columbia River Basin (CRB) forests.**

The objective of the project is to produce a standardized procedure to estimate smolt production capability for use by the CRB forests and coordinated with Pacific Northwest Forest and Range Experiment Station (PNW) fisheries group, and Regions 1 and 4. We propose to develop a smolt production capability index (SCI) that uses data collected by all three regions. This project is co-sponsored by the R-6 FHR Program and the PNW fisheries group.

**2. A cumulative effects procedure for the Columbia River Basin forests.**

The objective of this project is to develop a cumulative effects assessment procedure to estimate the influence of land management activities on CRB tributaries. This effort was coordinated with watershed and developed to assist in Biological Assessment preparation for Snake River anadromous forests consultation with the National Marine Fisheries Service under section 7 of the Endangered Species Act. This will likely serve as the basis for our regional cumulative effects procedure. The project was co-sponsored by the R-6 FHR Program and the regional watershed staff.

**3. A compilation of relevant literature for habitat parameters for PNW PACFISH effort.**

The objective of the project was to compile literature that may aid in developing numeric values for key habitat parameters in anadromous fish streams. This information was used to set ranges of variability for temperature, pool frequency, width/depth ratio, and woody debris size and frequency. The project was co-sponsored by the R-6 FHR Program and the Pacific Northwest station.



#### **4. A protocol for effectiveness monitoring of resident and anadromous fish habitat.**

The objective of the project is to develop an effectiveness monitoring protocol for stream habitats. Five forests were originally chosen to participate as test forests to develop regional protocol for effectiveness monitoring. Two forests were selected for anadromous fish habitat protocols and three forests for resident trout protocols (habitat relationships for Bull trout). This project was co-sponsored by the R-6 FHR Program and Oregon Department of Fish and Wildlife.

#### **5. Development and testing of a region-wide, high elevation lake inventory protocol.**

The objective of this project is to develop an interdisciplinary inventory of high elevation lakes. This protocol will be used to evaluate the potential of these lakes for supporting fisheries and aquatic communities. This project is co-sponsored with the regional watershed, wilderness and air staff groups. Initial protocol was tested on five forests and will be critiqued. The final protocol will be available by May, 1993.

#### **6. A watershed/riparian resource condition assessment process for use on four eastside forests.**

The objective for this project is to develop an assessment of watershed condition and stream habitat restoration needs. The process provided for assessment of more than one million acres. This project, part of the Blue Mountain Ecosystem Restoration Project, was cooperatively developed with watershed and the R-6 FHR Program.

In addition to region-sponsored projects, R-6 currently has a Memorandum of Understanding with PNW for specific products including the following: (1) providing assistance to the region in the development and testing of standardized Level III stream survey procedures; (2) long term monitoring of existing fish habitat/fish population and smolt production information through FY91 for each of the Fish Creek, Meadow Creek, Schooner Creek and Elk River monitoring sites;

(3) investigating the use of the "community" approach in estimating cumulative effects. Initiated study (graduate level) to evaluate effects of habitat change in fish community structure; and (4) Sensitive Species -- initiate a five year plan to investigate life history characteristics and habitat utilization of sea run cutthroat trout.

## **Technology Transfer**

Technology transfer is a key activity in the FHR Program. In 1992 both national and regional FHR units participated in 13 technology transfer activities. These included continuing education short courses, newsletters, and a variety of other activities. The following are the summaries for technology transfer in the national and regional FHR programs.

### **National FHR Program**

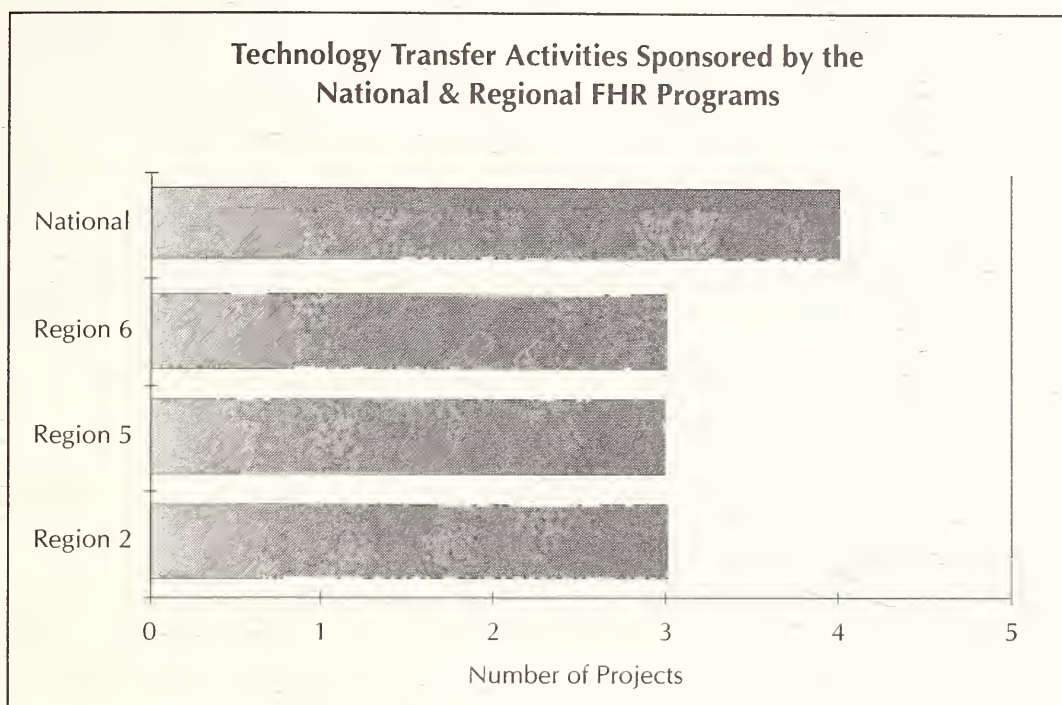
#### **Continuing Education Courses**

The FHR Program has demonstrated a commitment to continuing education by sponsoring not only the original core set of classes, but expanding the curriculum to include technical courses that are relevant to fisheries biologists. The following are the courses offered by the Unit in 1992, a brief description of content, and numbers and types of participants.

##### *Basin Surveys and Applications*

This course is designed to provide biologists and hydrologists with a statistically reliable survey method for aquatic inventories. The course covers general theory of the method, hands-on field demonstrations, computer application of the database, and application of the information to management activities. We hosted one course in 1992, with a total participation of twenty people. These people came from two federal agencies, one state agency, and one tribal group.





#### *Program Management*

This course is designed to provide biologists and botanists with the skills to conduct successful fish, wildlife, and botany programs. The course covers a variety of topics including budget training, personnel development, program marketing, and the use of forest plan information to develop a successful program of work. Participants included 30 biologists from all regions of the Forest Service. In addition, regional courses in program management were offered to fish and wildlife biologists and botanists.

#### *Fish Habitat Management*

This course is designed to provide mid-career biologists with new ideas and concepts in fish habitat management. The course covers ideas such as landscape ecology, evaluating cumulative effects, limiting factors analyses and other relevant topics. Two sections of the course were offered, one at Virginia Polytechnic Institute and the other at Utah State University. A total of 56 participants from the Forest Service, two state agencies, and the Bureau of Land Management (BLM) attended.

#### *Introduction to Instream Flow Analysis*

The course serves as an introduction to concepts in instream flow analysis. It provides an overview of instream flow analysis techniques. This course was offered to 18 biologists from R-6 and five biologists from other regions of the Forest Service.

#### **Publications**

The national FHR unit publishes an electronic newsletter, "THE FISHWORKS" four times a year. The purpose of the newsletter is to share information between biologists, hydrologists, and researchers; information is also provided on requests for various products and literature. The services provided by the unit are detailed in an annual information brochure available from the FHR group in Logan. In 1992, the FHR unit responded to over 400 requests for information.

Dave Fuller (R-5 Anadromous FHR staff) worked with Jeff Kershner (National FHR Leader) on compiling a publication that includes examples of the applications of basin-level stream inventory data. This publication contains nearly 30 examples covering a wide range of topics pertinent to Forest Service activities. This publication will be used as

a text for the Basin Survey Shortcourse in future years and will be distributed nationally to Forest Service fishery biologists.

## **Region 2: Rocky Mountain Region FHR Program**

### **Continuing Education Program**

FHR Program Leader Nick Schmal participated in two courses as an instructor, and as co-coordinator of one workshop. In the Basin Surveys and Applications course Nick lectured on Integrated Resource Inventories and how they relate to project level field surveys. He facilitated the Basin Surveys course during spring of 1992. In the Fish Habitat Management course he lectured on monitoring inland cold-water fish habitat at the forest level. In addition, he reviewed the R-2 Integrated Resource Inventory (IRI) Program at the Eastern Region (R-9) Summer Fish Habitat Management Workshop in Park Falls, WI.

## **Region 5: Pacific Southwest Region FHR Program**

### **Continuing Education Program**

In January, the Anadromous FHR Program provided computer training and assistance to the Lassen NF in a two-day training where biologists were instructed in the use of databases to summarize stream inventory data.

In February, biologists and technicians from the U.S. Fish and Wildlife Service, National Park Service, and the California Conservation Corps were instructed in stream and riparian mapping techniques for large and small streams.

In May, the sixth annual Northern California Stream Habitat Assessment Training was held on Six Rivers NF. Biologists and technicians from the Forest Service, BLM, California Department of Fish and Game, and the Mattole Watershed Alliance attended this two-day session. Training included lectures and field instruction on the standard U.S. Forest Service, Pacific Southwest

Region stream habitat evaluation procedures. Sessions on habitat classification, fish observation, channel evaluation, large woody debris surveys, and amphibian surveys were conducted.

Jerry Boberg, anadromous FHR coordinator, was an instructor for the Basin Survey Shortcourse. This course is sponsored by the National FHR Program and is part of the Fish and Wildlife Continuing Education Program. Jerry taught a module on computerization of stream inventory data by using an example of the stream inventory database he developed for R-5.

### **Publications**

*FHR Currents* is the technical bulletin of the Pacific Southwest Region FHR Program. Each issue consists of a brief technical paper focusing on research findings, techniques, or other information pertinent to Forest Service biologists. Before publication, each issue is reviewed by a panel of Forest Service biologists and researchers. *FHR Currents* is distributed internationally, free of charge, to Forest Service fishery biologists and hydrologists, various state fishery agencies, Trout Unlimited coordinators, various universities, libraries, restoration organizations, and private consultants. Due to the success of *FHR Currents*, a publishing schedule was implemented during Fiscal Year 1992 that sets deadline dates for submissions, reviews, final edits, and distribution. In 1992 we published four *FHR Currents*. Beginning in FY94, *FHR Currents* will become the national FHR technical bulletin.

In October, the R-5 Fisheries Habitat Evaluation Handbook (FSH 2609.32) was finalized. The Pacific Southwest Region FHR team developed, coordinated, compiled and organized this handbook. The handbook provides direction for state-of-the-art fishery habitat assessment for California's national forests.



### **Region 6: Pacific Northwest Region FHR Program**

#### **Continuing Education Program**

The R-6 FHR Program conducted Stream Inventory Interpretation/Reporting courses for biologists and hydrologists. The courses are designed to teach biologists and hydrologists how to interpret data from stream inventories and use this data to support management activities. There were two regional training sessions during the year. Personnel from other regions, Oregon and tribal groups attended. The region sponsored a course in Instream Flow Incremental Methodology (IFIM) for biologists and hydrologists. This course taught the fundamentals of instream flow analysis and emphasized field techniques, data interpretation, and computer analysis. Personnel from R-6 as well as other regions attended.

#### **Publications**

*Aqua-Talk* is the FHR Program technical bulletin for the Pacific Northwest Region. It was established to provide aquatic specialists (biologists, hydrologist, etc.) with new information, technology, and training being developed in the region and elsewhere. *Aqua-Talk* is distributed to Forest Service fishery biologists, hydrologists, and fishery agencies in Oregon and Washington. In addition, fishery biologists from the above states have been officially invited to publish a brief technical paper focusing on their research findings or new techniques. In 1992 two issues of *Aqua-Talk* were published.

#### **Other Activities**

FHR Program leaders are involved in a variety of other activities and provide expertise to all levels of the Forest Service from district offices to the Washington Office. In the Columbia Basin, FHR specialists Kerry Overton, Rich Torquemada, and Debbie Konnoff are helping to develop inventory and monitoring standards for the Columbia Basin Policy Implementation Guide. In addition, these

specialists are developing numeric standards for desired stream habitat conditions.

In the Rocky Mountain Region, FHR specialist Nick Schmal has cooperatively developed with watershed specialists a "Common Water Unit Hierarchy". This hierarchy is a series of map layers that will serve as the water elements for Ecosystem Management. In R-5, FHR specialists and hydrologists are assisting forests in developing monitoring plan objectives and sampling regimes. In all, FHR Program leaders participated in 47 activities designed to assist all levels of the Forest Service to achieve "Technical Excellence in Fisheries".



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